

CLAIMS:

1. A polishing system for polishing optical connectors, the polishing system comprising:
  - (a) at least one polishing station including a region of polishing film overlying a substrate block;
  - (b) a polishing fixture having:
    - (i) a plurality of connector mounting holes disposed across an area of said polishing fixture, each of said connector mounting holes receiving an optical connector, and
    - (ii) a working liquid supply arrangement including a plurality of working liquid release channels for directing working liquid to regions adjacent to said connector mounting holes, at least one of said working liquid release channels being interspaced between a plurality of said connector mounting holes; and
  - (c) a drive system for generating relative motion between said polishing fixture and said at least one polishing station so as to polish the optical connectors.
2. The polishing system of claim 1, wherein each of said connector mounting holes has a nearest neighbor spacing measured from said connector mounting hole to a nearest neighboring connector mounting hole, and wherein a spacing from each of a majority of said connector mounting holes to a nearest one of said working liquid supply channels is not more than twice an average of said nearest neighbor spacings.
3. The polishing system of claim 1, wherein a majority of said connector mounting holes are substantially equidistant from a nearest one of said working liquid supply channels.
4. The polishing system of claim 1, wherein said polishing fixture includes a mounting plate, both said connector mounting holes and said working liquid supply channels being formed as openings through said mounting plate.

5. The polishing system of claim 1, wherein said drive system is associated with said polishing fixture so as to move said polishing fixture along a two-dimensional polishing path relative to said at least one polishing station and wherein said at least one polishing station is configured to hold said region of polishing film static while said polishing fixture moves along said polishing path.
6. The polishing system of claim 5, wherein said drive system is further configured to raise said polishing fixture out of contact with said at least one polishing station on completion of a polishing operation.
7. The polishing system of claim 6, wherein said drive system is implemented as a set of three linear actuators.
8. The polishing system of claim 1, further comprising an optical cable support including at least one reel for receiving lengths of optical cables associated with the optical connectors being polished.
9. The polishing system of claim 8, wherein said cable support further includes a displacement mechanism configured to allow displacement of said reel in at least one direction.
10. The polishing system of claim 1, further comprising a flexible optical circuit support rack associated with said polishing fixture for supporting a flexible optical circuit associated with the optical connectors being polished.
11. The polishing system of claim 10, wherein said flexible optical circuit support rack includes a clamping plate extending vertically above said polishing fixture, said clamping plate having a two dimensional array of bolt holes.
12. The polishing system of claim 1, further comprising a cleaning station including:
  - (a) a wiping cloth supply roll;
  - (b) a wiping cloth receiving roll;

- (c) a length of wiping cloth partially stored on said supply roll and stretched to said receiving roll so as to leave an exposed wiping cloth region; and
- (d) a winding actuator associated with said receiving roll and configured for actuating said receiving roll so as to bring a new portion of said length of wiping cloth into said exposed wiping cloth region.

13. The polishing system of claim 12, wherein said supply roll, said receiving roll and said length of wiping cloth are implemented as parts of a wiping cloth cassette.

14. The polishing system of claim 1, further comprising:

- (a) a polishing film feed mechanism for selectively exchanging said region of polishing film overlying said substrate block; and
- (b) a computerized controller for controlling said drive system and said feed mechanism, said controller being configured to:
  - (i) actuate said drive system during a first polishing operation so as to move a batch of optical connectors in a polishing motion along a corresponding set of polishing profiles in contact with the static polishing film,
  - (ii) actuate said drive system during at least one additional polishing operation so as to move a batch of optical connectors in a polishing motion along a corresponding set of polishing profiles in contact with the static polishing film, said polishing profiles of said additional polishing operation being interspaced with, and non-overlapping, said polishing profiles of said first polishing operation, and
  - (iii) actuate said feed mechanism so as to advance said polishing film.

15. A polishing system for polishing optical connectors, the polishing system comprising:

- (a) at least one polishing station including a region of polishing film overlying a substrate block;

- (b) a polishing film feed mechanism for selectively exchanging said region of polishing film overlying said substrate block;
  - (c) a polishing fixture having a plurality of connector mounting holes disposed across an area of said polishing fixture, each of said connector mounting holes receiving an optical connector;
  - (d) a drive system for generating relative motion between said polishing fixture and said at least one polishing station so as to polish the optical connectors; and
  - (e) a computerized controller for controlling said drive system and said feed mechanism, said controller being configured to:
    - (i) actuate said drive system during a first polishing operation so as to move a batch of optical connectors in a polishing motion along a corresponding set of polishing profiles in contact with the static polishing film,
    - (ii) actuate said drive system during at least one additional polishing operation so as to move a batch of optical connectors in a polishing motion along a corresponding set of polishing profiles in contact with the static polishing film, said polishing profiles of said additional polishing operation being interspaced with, and non-overlapping, said polishing profiles of said first polishing operation, and
    - (iii) actuate said feed mechanism so as to advance said polishing film.
16. A polishing system for polishing optical connectors, the polishing system comprising a cleaning station having:
- (a) wiping cloth cassette including:
    - (i) a wiping cloth supply roll,
    - (ii) a wiping cloth receiving roll, and
    - (iii) a length of wiping cloth partially stored on said supply roll and stretched to said receiving roll to as to leave an exposed wiping cloth region; and

- (b) a winding actuator associated with said receiving roll and configured for actuating said receiving roll so as to bring a new portion of said length of wiping cloth into said exposed wiping cloth region.

17. A method for polishing optical connectors of a flexible optical circuit, the method comprising:

- (a) providing a polishing fixture including:
  - (i) a plurality of connector mounting holes disposed across an area of said polishing fixture, each of said connector mounting holes receiving an optical connector, and
  - (ii) a support rack for supporting a flexible optical circuit;
- (b) mounting a flexible optical circuit with a plurality of optical connectors mounted in the connector mounting holes and with at least part of a body of the flexible optical circuit attached to the support rack; and
- (c) generating relative motion between the polishing fixture and a polishing surface.

18. The method of claim 17, wherein said relative motion is generated by a drive system associated with the polishing system, the polishing surface remaining static at least during a given polishing operation.

19. A method of polishing of the leading end face portion of a plurality of batches of optical connectors having a foremost end having a ferrule integrated with optical fiber, comprising steps of:

- (a) mounting first batch of optical connectors in a polishing fixture having a plurality of optical connectors mounting holes at a predetermined inclination angle and a plurality of working liquid delivery openings interspaced with said optical connectors mounting holes;
- (b) bringing said leading end faces of said mounted in the polishing fixture first batch optical connectors into forced contact with a static polishing member;
- (c) sliding said polishing fixture with the first batch of optical connectors simultaneously in two independent and orthogonal directions on said polishing member;

- (d) supplying through a plurality of openings and channels in said polishing fixture a working liquid to a plurality of optical connectors being polished and to said polishing member;
- (e) polishing the surface of the leading end face portion of the first batch of optical connectors by said sliding movement in a brushing pattern generated by independent changes of said sliding movement speed in each of said two orthogonal polishing fixture movement directions; and
- (f) controlling all of the polishing and auxiliary processes by a computer, said computer monitoring and memorizing all of the processes steps and parameters,

wherein at least one of the polishing process parameters for polishing the surface of the leading end face portion of at least one of the following optical connector batches is changed by said computer, based on the results of previously polished optical connectors batch.